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A research agenda for studying managerial decision making through the lenses of simple heuristics

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Abstract

Management practitioners often preconsciously rely on simple heuristics when approaching ill-structured decision problems. Simple heuristic research suggests that those simple cognitive strategies do not only constitute a fast mode of deliberation but may also be effective. Nonetheless, empirical research using simple heuristics as a theory of managerial or organisational cognition remains sparse. To stimulate empirical research, we propose concrete avenues for research, starting with the empirical problems and then considering how simple heuristics can be used as a lens to address these issues. We illustrate our argument by focusing on empirical problems involved in project decisions. Specifically, we discuss three problems that both pose a challenge and offer an opportunity for simple heuristic research: decision (or problem) framing, acquisition and use of unstructured information, and identification of options. We discuss these challenges along two views: the use of heuristics through the practitioner and the development of heuristics in the context of the organisational environment. Our article contributes to the research on project decision making through concrete guidance for designing empirically relevant research within the simple heuristic paradigm, as well as to the simple heuristic community by extending the research into novel empirical problems and methodological approaches.

1. Introduction

Managers often face ill-structured decision problems, for which classic analytical approaches are unavailable or unfit (Simon, 1973, 1956). In such cases, these practitioners often – though not always openly so – rely on their intuition or tacit 'expert judgement' to deliberate on the decision problem and choose a course of action (Akinci and Sadler-Smith, 2012; Dane and Pratt, 2007; Hodgkinson and Sadler-Smith, 2018). In this paper, we discuss the simple heuristic programme (Gigerenzer et al., 2011) as a lens to study the cognition of managerial decision making and to shed light on the processes of expert judgement and intuition.

Simple heuristics are cognitive strategies that enable 'fast and frugal' inferences for complex decision problems by drawing only from a small subset of the available information and processing this information through simple algorithms (Gigerenzer and Gaissmaier, 2011). Earlier, Simon (1956) proposed such heuristics as suitable strategies to solve 'ill-structured' problems in organisational decision making. More recent contributors, such as Artinger et al. (2015) and Mousavi and Gigerenzer (2014), emphasise this theoretical suggestion, and the academic interest in heuristics in managerial and organisational decision making is continuously growing (Loock and Hinnen, 2015).

However, the research paradigms accepted in management research and the simple heuristic research programme differ significantly. The first is eclectic, inspired by a variety of disciplines, such as sociology, political sciences and economics (Tsoukas and Knudsen, 2005), while the second is firmly grounded in psychology and as such, paradigmatic and mostly positivist. Consequently, management scholars pursue different research problems or questions and thus use methodologies that differ from those applied in the study of heuristics. Owning to the paradigmatic difference between the fields, we cannot just transfer research questions and methodologies from the heuristic research programme into management contexts.

Such a transfer would imply asking questions and making contributions that are usually considered less interesting or relevant to managerial contexts (Zahra and Newey, 2009).

We propose an alternative approach to studying heuristics in management contexts, inspired by organisational research, extending the previously suggested 'heuristics in the wild' approach (Gigerenzer et al., 2011). Our first suggestion is to begin the research with the problem, not the theory, and then explore how the theory can explain behaviours related to the problem. As such, when studying management decisions, we suggest that scholars develop a rich understanding of the context and the idiosyncrasies it carries. Such a shift from research driven by theoretical questions, studied in controlled contexts, to research driven by real-life problems, studied in rich decision contexts 'in the wild', has obvious implications for the methodological design of studies. We therefore investigate alternatives, particularly qualitative methodologies, which we argue are fruitful research opportunities for simple heuristics in management contexts.

To illustrate our points, we need to focus on a specific context and its particular managerial challenges. We focus on decisions in projects as our empirical context. For reasons that we will detail in the next section, from both the practical and the theoretical stance, projects comprise an empirically relevant, theoretically accessible and researchable context to study managerial decision-making. We therefore ask, 'How can we research individuals' decision-making behaviour in projects through the lens of simple heuristics?'

From the perspective of this question, our paper contributes to the academic communities of both managerial decision-making and simple heuristics. For managerial decision-making research, we provide concrete guidance for designing empirically relevant research within the simple heuristic paradigm. For the simple heuristic community, we contribute to the 'heuristics in the wild' research by discussing challenges

that result from the particular empirical circumstances and by suggesting how to address these challenges through careful formulation of the research problem and use of novel methods.

This paper is organised as follows: in Section 2, we introduce the empirical context of project decision-making, pointing to particular challenges in this context. In Section 3, we summarise the key notions of the simple heuristic paradigm and the current research on the heuristics of managerial practitioners. Building on this, in Section 4, we connect theory and context to a comprehensive research agenda. In Section 5, we conclude the paper with a discussion of the research agenda and an outlook for future research.

2. The problem: behavioural decision making in projects

In this section, we introduce projects as constituting a managerial context for the study of simple heuristics. We first argue why we have chosen projects as illustrations. We then situate this paper within the research on project decisions and describe two typical problems of that context: the challenge of uncertainty in the definition and assessment of a 'good decision', and the institutional influence on individual cognition.

2.1. Why projects?

Projects are temporary vehicles used to undertake unique and complex endeavours and thereby transform the status quo. We have chosen to study project decision making for four reasons.

First, projects are all around us, from the construction of an iconic building to the merger of large corporations. In financial terms, spending on infrastructure projects worldwide is assessed at US$6–9 trillion annually, which is equivalent to 8% of the global gross domestic product annually (Flyvbjerg, 2014). Projects affect not only infrastructure. Projects have become a dominant form of organising in business and society (Lundin et al., 2015). It is through projects that companies deliver innovation, new strategies or a

105 novel marketing campaign. Moreover, several industries are solely organised through projects, such as
106 consultancy, construction, media and films, to name a few.
107
108 Second, while multi-project organisations aim to streamline the execution and the management of their
109 projects, many projects remain unique in their own complex system of stakeholders, tasks, dependencies,
110 goals and so on and have limited useful historical data. As such, repeatability is harder to identify than in
111 other management contexts where operations are cyclical and repetitive. Thus, for many project decisions,
112 practitioners need to rely on generic decision strategies based on heuristics rather than on learned and
113 developed strategies (Artinger et al., 2015). Nonetheless, even in highly complex contexts, we can find
114 aspects that are repetitive and cannot be outsourced to machineries, such as interpreting people's feelings,
115 phrasing intelligent and appropriate questions, making sense of status reports, among others. For these
116 recurring yet fuzzy instances, we expect that practitioners have developed heuristics that help them
117 navigate each situation. Thus, projects provide a rich context to research on the development of fast and
118 frugal heuristics.
119
120 Third, while akin to the decision contexts of middle and top managers and knowledge workers, the decision
121 challenges faced in projects are magnified due to an increased level of uncertainty, particularly concerning
122 the complex technical and social systems involved in projects (Davies and Mackenzie, 2014; Geraldi et al.,
123 2011). Thus, using projects as illustrative cases can serve as useful guidance for subsequent considerations
124 of other managerial decision contexts.
125
126 Fourth, projects are temporal organisations that are formed and then dissolved (Lundin and Söderholm,
127 1995). This temporary existence makes their boundaries more easily defined and studied. Additionally, a
128 project typically has stakeholders who meet repeatedly and intensively throughout the period of the
129 project. These interactions provide room for learning and sharing of decision-making heuristics or routines.

These interactions make projects excellent opportunities to study the development of shared heuristics and how contextual aspects shape the selection of individual cognitive strategies.

2.2. What is the decision?

A project can be perceived as a vast collection of decisions (Stingl and Geraldi, 2017). They span from strategic decisions, such as the decision to launch or terminate a project, to mundane and day-to-day decisions, such as what information to share in a meeting or whether to accept minor changes in the project plan (Rolstadås et al., 2014). These choices shape the project and are core mechanisms through which a project manager and other stakeholders can influence the direction of the project. Therefore, it is important to study decisions to enhance the understanding of projects.

Possible definitions of decisions in organisational and project studies cover a wide range, including explicit decision events, messy 'emerging decisions' or inaction and indecisiveness (March, 1994). For the purpose of this paper, we focus only on *explicit decision events*, involving conscious judgement or choice (if only for inaction) by an individual or a group. This delimitation does not imply a depreciation of other concepts of managerial or organisational decision making, which acknowledge implicit or entangled decision processes. However, it is necessary because the research following the simple heuristic paradigm requires specific instances of judgement and choice.

When exploring decisions as events in projects, we further acknowledge that actors in projects (and elsewhere) are not rational decision makers. A core interest of the research in project decisions is how project practitioners *do* make their decisions if not according to the standards of normative rationality (Stingl and Geraldi, 2017).

As projects are vehicles for change (Turner and Müller, 2003), they are inherently uncertain. Specifically, uncertainty in this context means the limited and unreliable nature of available decision-relevant information. This uncertainty results from the complexity of a project as a socio-technical system, the ambiguity of meanings and definitions across actors, and the lack of knowledge about both the present and the future (Hällgren et al., 2012). Particularly, this fluid nature of ambiguity, complexity and a dynamic and unpredictable future creates a context in which project decisions conform to Knight's (1921) definition of uncertainty rather than to risks with a specified probability (Daniel and Daniel, 2018). From this uncertainty, we derive the three main challenges to project decision making: lack of reliable information, ambiguous definition of 'the good decision', and inherent misalignment of interests and perspectives across actors.

The lack of reliable information is manifested across all types of project decisions, albeit often for different reasons. The novelty of projects limits the availability of historical or experiential information, time pressure reduces the potential to gather information, and the complexity of the project's technical and organisational aspects limits the potential to analyse dependencies and relationships in full (Geraldi et al., 2011). Moreover, the forward orientation of projects, embedded in a dynamic environment, creates the challenge that decision-relevant aspects are simply unpredictable at the moment of the decision (Daniel and Daniel, 2018). Furthermore, relevant information in projects is often buried in more noise than signal, highlighting the need for project practitioners to capture weak signals (Ramasesh and Browning, 2014). This challenge particularly highlights the question of how practitioners search for information or selectively pay attention to specific informational aspects.

In summary, the information environment in project decisions is often unstructured, information is captured in different forms, often ambiguous, and the alternative paths to decide on are undefinable. Thus,

178 project decisions often depend on the project manager's ability to capture the right information and
179 envision and create options, rather than choose only one (Gil, 2007).
180
181 The ambiguous definition of 'the good decision' results from diverging priorities or goals across
182 stakeholders, as well as the fuzzy relation between successful project management and a successful
183 project. First, projects often serve multiple, sometimes contradictory purposes, such as creating profits
184 versus being vehicles for sustainable or social changes, and usually, different stakeholders defend different
185 purposes (Davis, 2014). Consequently, the notion of a good decision varies among stakeholders because
186 'good' is a subjective judgement of the individual actor. Second, decision outcomes will be manifested in
187 the future and may be subject to unpredictable developments on the way there. Thus, project researchers
188 have contested an unequivocal relation between 'good' project management practices – including decision-
189 making practices – and 'good' project outcomes (Cooke-Davies, 2002). A particular observation made
190 regarding project decision making is the attention paid to making 'resilient' rather than 'optimising'
191 decisions, that is, prioritising the ability to react and adapt in the future over aiming for the best possible
192 outcome (Kutsch and Hall, 2016).
193
194 Misaligned interests and perspectives emerge as projects typically require collaboration and coordination
195 among a variety of stakeholders, sometimes coming from different organisations and representing diverse
196 skills and capabilities (Davies et al., 2018). This creates different interpretive frames and incentives across
197 the actors, giving rise to misunderstandings, conflicts and ambiguity. Thus, project managers may need to
198 not only evaluate the potential costs, delays and stakeholders' reactions but also consider how different
199 stakeholders will frame the situation and what decisions will emerge from such framings. As such, there is
200 no clear definition of what a decision should be; instead, the framing of the decision itself is part of the
201 decision making in projects (Tryggestad et al., 2013). The complex interdependencies among stakeholder

groups (and technologies) can further exacerbate the challenges involved in the decisions, as consequences of actions are difficult to determine upfront (Geraldi et al., 2011).

Hence, the uncertainty of many project decisions creates a setting where no single 'best' decision can be found through careful analysis. Similar to Simon's (1955) suggestion, project practitioners aim to find the 'good enough' option. In that case, 'good enough' means balancing the (ambiguous) objectives for the decision outcome, the expectations of how the decision will lead to specific outcomes, and the boundaries of the decision context in terms of information availability or the cost of the (information) search. Moreover, in the context of uncertain information and ambiguous objectives, project practitioners face the challenge that there is no clear definition of what the decision is about. Thus, together with the described unstructured informational environment and an undefined number of potential options, project decisions are akin to ill-structured problems (Simon, 1956).

When researching ill-defined problems, we favour descriptive over prescriptive research. Here, descriptive research means the investigation into how practitioners *make* decisions in practice, rather than how they *should* make these decisions. Because of the argued complexities inherent in the definitions of 'good' decisions in projects and hence the difficulties to establish what would be a 'better decision', we suggest that descriptive research provides the more valuable avenue as it allows novel theorising in the context of the decision.

As suggested by Stingl and Geraldi's (2017) literature review on behavioural decision making in projects, most descriptive research on project decision behaviour is conducted in separated schools of thought that either frame human cognition as a source of bias or treat it as a black box that underlies the observable individual and group behaviour that is the interest of the research. Specifically, the prevalent research on heuristics in project, follows the tradition of Tversky and Kahneman's (1974) "heuristics and biases",

227 therefore focussing on *what* the individual ultimately decides. In contrast, descriptive research on adaptive,
228 simple heuristics opens opportunities to probe into the question of *why and how* an individual arrives at
229 the observable decision by identifying and comparing possible cognitive strategies without *a priori* labelling
230 this cognition as inherently biased or wrong. We therefore believe that the descriptive stream of simple
231 heuristics offers the theoretical foundation to study descriptive decision behaviour in project contexts.
232

233 **2.2.1. What is the decision context?**

234 Projects are embedded in an institutional context; the temporary organisation created to execute the
235 project is connected to the parent organisation or organisations that have initiated the transformation
236 (e.g., the new building, or the merger or a new product). As the temporary organisation is created for each
237 project and expected to 'die' when it fulfils its function, it will adopt and mirror the managerial practice of
238 its surrounding organisations (Grabher, 2002; Sydow and Staber, 2002), while profiting from a certain
239 degree of autonomy. The consequence is that decision-making structures will vary from project to project.
240

241 Hence, decision makers will exploit their existing expert intuition, that is, they will draw on their experience
242 and adapt it to the new project conditions. At the same time, we can expect them to learn and develop
243 new forms of decision making in the course of a project, potentially even devising shared ways of making
244 decisions and creating meaning across the project organisation ('Where are we? What action is appropriate
245 for that situation?') (Abatecola, 2014; Oliver and Jacobs, 2007). The shared decision strategies in each
246 project could be perceived as explorative knowledge developed for the project.
247

248 Moreover, ambidextrous capability – the ability to both exploit strength and explore new opportunities –
249 has been a core concern in the management of projects (e.g., Brady and Davies, 2004; Turner et al., 2016).
250 However, we lack insights on the cognitive setup that allows individuals to navigate between exploration
251 and exploitation in messy project contexts. Thus, the study of *individual cognition* and its interactions with

252 context is promising and could shed light on the static and the dynamic facets of the expert intuition used
253 in projects. Simple heuristics address this challenge by examining adaptive behaviour toward a specific
254 context.
255

256 ## 3. Simple heuristics as a theory of the cognition of individual decision making

257 ### 3.1. Heuristics in managerial decision making

258 Managerial studies have provided ample evidence of heuristics at the foundation of managerial decision
259 making, as 'intuition' or 'gut feel' (Dane and Pratt, 2007; Leybourne and Sadler-Smith, 2006), as explicit
260 'mantras' (Eriksson and Kadefors, 2017) or as 'simple rules' (Bingham and Eisenhardt, 2011). Recent
261 publications have increasingly reflected the work of Gigerenzer et al. (2011) and the simple heuristic
262 programme as theoretical framing for the study of heuristics in organisations (Loock and Hinnen, 2015).
263

264 As a theory of cognitive sciences, simple heuristics posit that human judgement and decision making are
265 based on a set of adaptive cognitive strategies that make fast and frugal use of a subset of available
266 information in the form of cues (Gigerenzer and Gaissmaier, 2011). This conceptualisation follows a
267 widespread (though not uncontested) notion of cognitive science, which states that the mind possesses a
268 repertoire of cognitive strategies to approach decision and judgement problems (Einhorn and Hogarth,
269 1981; Pachur and Bröder, 2013). In that view, simple heuristics are adaptive tools that decision makers
270 consciously or preconsciously select and apply in different decision contexts (Gigerenzer, 2000; Marewski
271 and Schooler, 2011).
272

273 This simple heuristic programme researches the structure of these cognitive strategies and the question of
274 how individuals develop and select among them. The programme encompasses questions of both a
275 prescriptive nature ('What is an efficient decision strategy for this context?') and a descriptive nature

276 ('What decision strategies do individuals apply in a certain context?'). The interest in heuristics in
277 managerial decision making has strongly leaned towards the prescriptive stream, that is, a focus on the
278 statistical evaluations of the ecological rationality of selected heuristics for a specific decision problem
279 without investigating managers' actual cognitive strategies.
280
281 However, some descriptive studies have aimed at identifying specific heuristics used by managers and
282 management teams. As argued in the introduction, our study focuses on the descriptive stream of heuristic
283 research. Managerial decision problems researched in this stream investigate cognitive strategies of
284 selecting target customers (Bauer et al., 2013; Persson and Ryals, 2014; Wübben and Von Wangenheim,
285 2011), making investment decisions (Berg, 2014; Gamble and Allport, 2015), forecasting future financial
286 performances (Cianci and Kaplan, 2010), selecting personnel (Luan et al., 2019) or judging credit ratings
287 (Summers et al., 2004). A common denominator of those studies is that they provide examples of recurrent
288 decisions made in similarly structured information environments. Many of them have additionally used the
289 typically data-rich environment to evaluate subsequently the performance of the identified heuristic and
290 decision behaviour against specified success criteria.
291
292 These studies focus on the question of whether managerial decision makers use heuristics, and if so, which
293 heuristics, by comparing observed decision behaviour with expected decision behaviour that a model of
294 a specific heuristic would predict. For example, in Persson and Ryals' (2014, p. 1728) analysis of marketing
295 decisions in the Nordic banking sector, the decision problem is defined as 'determining the status of the
296 customer as active or inactive'. The cues are directly linked to the data structure of a bank's information
297 system, and clear success criteria for the correct status determination are provided. Thus, this approach
298 defines the decision problem as a specific question, provides explicit cues, and – in case of prescriptive
299 intents – evaluates the judgement based on a success metric defined by the researchers.
300

Alternatively, a few studies discuss heuristics at the organisational or group level as guiding principles embedded in narratives (Oliver and Jacobs, 2007), as shared mantras or catchphrases (Eriksson and Kadefors, 2017) or as simple rules (Bingham and Eisenhardt, 2011; Davies et al., 2017). These works refer to the simple heuristic programme and particularly to its claim of such heuristics being ecologically rational (for a critique of this claim, see Vuori and Vuori, 2014). However, these works are less concerned with the individual cognitive strategies and their development, which are likely to form the foundation of the explicit and observable shared organisational heuristics. Nonetheless, these studies point to the important issue that heuristics can act as shared interpretive tools that potentially co-evolve at the cognitive level of the individuals in a group and facilitate shared decision making (Abatecola, 2014).

In summary, the current research on simple heuristics follows two separated paths: the structural exploration of individual heuristics for specific, relatively well-defined problems or the study of shared rules at the organisational level, which are decoupled from a specific decision problem and the cognition of the individual.

3.2. Expanding the study of managerial decision making through simple heuristics

Considering the complex, subjective and dynamic context of decision making, as described in the project context, and the review of heuristics in managerial literature in general, we identify two white spots. First, we find no descriptive research regarding the individual cognition in a nuanced and turbulent decision context. Second, we find no research on the role that the organisational environment plays in the development of individual cognitive strategies. This latter area would aim at establishing a link between simple rules and individual cognitive strategies. We argue that both areas of investigation would benefit from increased attention through the descriptive stream of heuristic research, from which follows our proposed research agenda.

First, as a theoretical frame, simple heuristics allow identifying, describing and comparing individual cognitive strategies of decision makers. The simple heuristic view investigates *why and how* an individual arrives at an observable decision by identifying and comparing possible cognitive strategies. These investigations have yielded abundant structural descriptions of heuristics, such as satisficing (Selten, 1998; Simon, 1955), recognition heuristics (Gigerenzer and Goldstein, 1996), one-clever-cue heuristics or take-the-best heuristics, among others. A couple of reviews (Artinger et al., 2015; Gigerenzer and Gaissmaier, 2011) provide a comprehensive overview of these different heuristic structures. Common to these structural descriptions is a rule-based approach to information search, information processing and decision making. Moreover, simple heuristic research has demonstrated that through experience, individuals develop consistently applied decision strategies in the form of simple heuristics (Dhami, 2003; Gacasan et al., 2016; Garcia-Retamero and Dhami, 2009; Pachur and Marinello, 2013; Summers et al., 2004). Thus, the simple heuristic research provides an appropriate angle to describe the cognitive processes of judgement and decision making.

Second, the conceptualisation of simple heuristics as learned, contextually shaped and (pre)consciously selected decision strategies allows studying how the (organisational) environment shapes individual decision behaviour. Hence, the programme offers an angle to study not only *whether* expert intuition or expert judgement follows heuristics but also theories on *how* such experience-derived heuristics are developed at an individual cognitive level, as well as the environment's role in this development.

Research on learning and selecting cognitive strategies has offered insights on how the learning environment can influence the development and adoption of specific heuristics (Pachur and Olsson, 2012; Rieskamp and Otto, 2006) or how an information environment provides cues for strategy selection (Marewski and Schooler, 2011). A key finding of this research is that the formulation of the decision problem, its statistical and informational environment, and how individuals receive feedback on their

choice shape the development of specific types of cognitive strategies adopted in the future (Pachur and Bröder, 2013). The organisational context thus shapes individual heuristics through the learning environment that it creates, as it influences reflection and feedback on the decision and consequently creates the criteria for perceived success or failure. The simple heuristic programme thus provides a theoretical framework to study how the environment shapes individual and shared decision behaviours by conceptualising simple heuristics as interpretive tools that evolve through interaction with the environment.

Adopting the stance of descriptive cognitive research and its view on the dynamic development of heuristics, we therefore use the following definition: *Simple heuristics are cognitive strategies for judgement and decision making that make use of a small subset of the available information through specific rules. Individual decision makers use those strategies adaptively to choose a 'good enough' alternative for a specific decision or judgement problem. Environmental aspects, such as feedback and information structure, shape how the decision maker develops and adaptively selects among those strategies.*

Reflecting the previously discussed complex, ambiguous and uncertain context of project decision making, this definition invites three critical lines of inquiry. First, if a specific heuristic is applied only to a specific decision problem, then what is the perceived decision problem that the decision maker considers? As many project decisions are ill-defined problems, they follow ambiguous success criteria that are open to subjective interpretation by the individual decision maker. Thus, to properly observe and analyse the heuristics at play, researchers need to understand the framing of the decision maker regarding the decision problem itself and how the individual subjectively perceives 'good enough'.

Second, if a heuristic only uses a subset of the available information, how can we determine what this subset is, in an environment of largely unstructured and ambiguous information? Such information environments are typical for the most salient and relevant decisions in project contexts.

Third, if a heuristic serves to choose the 'good enough' *alternative*, how do the decision makers identify the alternatives among which they choose?

Hence, research on project decision heuristics would benefit from an expansion beyond the question, 'What heuristics do project practitioners use in their decision making?', which aims at a merely structural description of heuristics and the cues used thereby. In the next section, we discuss how research can succeed in stepping beyond this question.

4. Discussion: a research agenda for studying behavioural decision making in projects through the lens of simple heuristics

Departing from the empirical context of project decision making, we have structured the research agenda as a framework of questions. The framework consists of two dimensions. The first dimension is related to either a static or a dynamic view of heuristics as cognitive strategies of decision making. The second dimension involves critical questions resulting from the definition of simple heuristics when applied to the context of project decision making.

Throughout this section, we use a specific example of a classic project decision: how to respond to a requested scope change in a commissioned project, that is, a project carried out for a customer. Commissioned projects usually have a contractually agreed scope of deliverables and specifications. However, as both the client and the project team learn more about the project – or as environmental factors change – the client may identify needs and preferences that were not part of the original scope (Kreiner, 1995). For example, the client may ask for an interface's integration into a particular software or

for a change in materials, may want to change the layout of the project site or may ask for additional functionalities in a software or a machine. The project manager and his/her team will then have to decide – often under considerable time constraints and with limited information – how to react to this desired change in scope. The typical reactive modes include accepting the change without adjusting the schedule and the cost, prompting a formal change request with an impact on the agreed schedule and cost or informing the customer that the change cannot be accommodated. Given the time pressure and the limited information availability in these situations, we suggest that project managers will rely on heuristics to approach this decision. However, studying such heuristics requires an extended set of questions and methodologies that we discuss in the following section.

4.1. Level of analysis: static versus dynamic view on simple heuristics

The first dimension of our research agenda follows the prototypical questions encountered in the literature on individual decision behaviour in projects, focusing on either the observed decision behaviour or its antecedents. Thus, we consider heuristics through either a static view (focusing on the heuristics that practitioners use for a specific decision at a specific point in time) or a dynamic view (asking how the organisational environment shapes over time the heuristics that experienced practitioners use).

The *static view* explores the heuristics used by project practitioners at the time of the research. It thus connects to prior heuristic research embedded in other contexts, which has specifically inquired about the cues that the individuals acquire and potentially consider in their decision making, and the cognitive processes of how these cues inform the decision. This view investigates *why and how* an individual arrives at the observable decision in the given instance by identifying and comparing possible cognitive strategies. As such, this view is aligned with the classic research problem of the 'heuristics in the wild' programme: 'What strategies do experts and lay people rely on in real-world decisions?' (Gigerenzer et al., 2011, p. xix). Nonetheless, following the lines of critical inquiry introduced before, we can develop

425 relevant sub-questions that inform and support this overarching research question and (as we will show)
426 point to other practical problems of project decision making and decision-making research, which can be
427 investigated through a simple heuristic lens.
428
429 The *dynamic view* investigates how specific heuristics are cognitively developed through influences and
430 feedback from the environment. This focus on the development and the selection of specific heuristics for
431 specific decision problems through influences from the environment connects to the questions addressed
432 by the literature concerned with the learning and the selection of heuristics.
433
434 The findings of this stream of literature indicate that the context can dynamically shape the development
435 and the selection of heuristics at the individual level through knowledge creation, feedback provision and
436 the structure of the informational environment. In other words, simple heuristic research suggests that an
437 organisation may (wittingly or unwittingly) provide a learning and informational environment that
438 influences the selection of the heuristics applied by its members in particular decision situations.
439 Consequently, the dynamic view allows exploring how the interaction between the individual and the
440 organisation influences the development of preferences for the selection of heuristics for specific decision
441 problems. The dynamic view thereby investigates differences across contexts, particularly across time ('Do
442 heuristics of individuals change as they familiarise themselves with a new project? Do individual strategies
443 converge within a project team over time?'), or across different projects that are exposed to various
444 environmental conditions.
445
446 This evolving and dynamic view of heuristics also offers to investigate broader phenomena of
447 organisational decision making and behaviour, particularly the phenomenon of organisational sensemaking
448 (Weick, 1995). This follows from two considerations. First, heuristics are cognitive strategies that guide the
449 perception and the interpretation of environmental cues or stimuli. Second, as suggested by Abatecola

(2014), the heuristics that guide these interpretations are likely to co-evolve among members in the same organisational or informational context. Following Weick's initial conceptualisation of the sensemaker's individual cognition as 'a frame of mind [...] that is best treated as a set of heuristics rather than as an algorithm' (1995, p. xii), converging heuristics across individuals may thus provide a cognitive explanation for convergence of meaning. This view supports Sandberg and Tsoukas' (2015) call to study the micro-foundations of organisational sensemaking through the individual cognition of the sensemakers.

4.2. Three critical challenges: problem framing, information use and identification of options

The second dimension reflects the assumptions and the concepts of simple heuristics against the challenges of the project decision-making context. For this dimension, we follow the three critical questions introduced before:

(1) What is the perceived decision problem that the decision maker considers?
(2) How does the individual search for and elicit cues from an unstructured and ambiguous information environment?
(3) How does the decision maker identify options?

4.2.1. Individual framing of the decision problem

Decision framing refers to the subjective perception of what the decision is about, entailing both the identification of the problem that requires a decision and the understanding of what purpose the decision should serve (i.e., the understanding of a 'good' or 'successful' decision).

Such framing is missing in many types of project decisions. First, many project decision instances are reactive to changing environments and are not embedded in processes that dictate the timing or the purpose of a decision. Second, the variety of values, preferences, beliefs and goals across a project team

(e.g., Atkinson, 1999; Flyvbjerg, 2014) and the variable time spans over which success may be evaluated (Davies et al., 2017) create an ambiguous success definition that trickles down to each decision within the project. Thus, what constitutes a 'good' decision in the decision maker's view will eventually reflect subjective preferences, values and individual experiences (Kreiner, 2014).

Hence, other than the classic simple heuristic research, the perceived decision problem as such is not necessarily clear to the researcher or even the decision maker. This latter view reflects a common argument of organisational studies, depicting decision making, not as an event, but as a process in which meaning is created (Kreiner, 2012; March, 1994).

Taking the example of the change request, the project manager has – in the absence of an explicit process within his/her organisation – neither a formal trigger for the decision making nor a formulated decision problem. In the project manager's perception, the client's request to change may thereby concern various problems, such as the following, among others: Is this change technically feasible? Is this change covered by the contract? How can I avoid additional costs? How and when should I respond to the request?

Thus, to research which heuristic the project manager applies to solve a problem, we first need to establish which decision problem he/she actually perceives to be facing. While studying the heuristics of predefined problems is valuable for the establishment of the simple heuristic theory, understanding the problem framing and its origin is critical to capture the lived experience of project practitioners (Cicmil et al., 2009, 2006). In this regard, the simple heuristics lens can provide a fresh view on how new information or specific stimuli – such as an e-mail by the client asking for a change – are cognitively processed, leading to first, a problem definition, and second, to a decision or decision-equivalent behaviour.

Kaplan and Simon (1990) suggest that heuristics can play an important role in the framing of the ambiguous or ill-defined problems that are typically encountered in project decision making. Thus, a potential research angle may ask: (How) Do heuristics inform the framing of the problem? Which cues from the environment are chosen to be considered relevant for the decision framing?

While the static view explores the problem framing and the heuristics supporting the problem framing at a specific point in time, the dynamic view investigates how the organisational environment and prior experiences have led to the observed problem framing. In our example, the project manager and his/her colleagues might frame the change request consistently around a decision about contractual compliance, while in a different project, a similar stimulus may trigger decisions about technical feasibility. The dynamic view would therefore ask how the organisational environment has shaped this framing and the heuristics in place that lead to that framing. The characteristics that could be explored in this regard include questions about feedback, routines of reporting and communication, shared preferences, formative events and so on. Thus, the questions of the dynamic view are as follows: Which organisational characteristics shape the heuristics that project practitioners apply to frame a decision problem? How do these heuristics for decision framing change over time in more or less turbulent environments? Under which circumstances do the heuristics applied for decision framing converge among members of the same project or organisational unit?

4.2.2. Individual uses of information as cues

The informational context of project decisions is typically unstructured and ambiguous, where anything can become a cue – the position of a cable in a technical drawing, the raised eyebrow of a colleague, the 5:45 AM time stamp of the client's e-mail and so on. Our example has countless potential information sources that the project manager may consider – technical designs and bills of quantities, opinions and attitudes of

team members, prior and current behaviour of the client, current financial and competitive situations of the company, personnel planning sheet and so on.

In brief, there are large amounts of information, different data formats (from qualitative to quantitative), uncertainties inherent in this information, different levels of availability and costs of information search, and limited control over which information actually captures the decision makers' attention (even when discounting the political processes operating in the background). The study of simple heuristics in such a context would therefore need to address the following questions: How do decision makers make sense of all this information? How do practitioners encode fuzzy information into cues? How do practitioners search their information environment for salient cues? Which cues are actually used? In particular, we suggest that the role of social cues, derived from the behaviour and the expressed opinions of other individuals in the project, merits increased attention in the study of managerial heuristics.

While heuristics build on the notion that only a few cues inform a decision, the unit of the cue is ambiguous. In practice, cues may not be clear-cut informational units, such as a number, a colour, a physical presence, among others. Rather, cues in organisational practice may be derived from situational patterns; various elements of interactions with a client lead to a classification as 'favourable' or 'unfavourable', or the cumulative aspects of a specific technical problem are judged as 'complex' or 'simple' (Shan and Yang, 2017).

Learning theory suggests that with experience, practitioners develop the ability to aggregate cues or signals into patterns ('chunks') and thereby increase the amount of information they can consider in a decision (Miller, 1956). This aligns with the findings of the naturalistic decision-making literature on the role of recognised patterns that give indications for appropriate choices of action (Lipshitz et al., 2001). This suggests that cues are not only distinct pieces of information provided by the environment but can also be

self-generated by the decision maker through holistic consideration of a situation or an aspect of it, where the aggregated judgement about the situation provides the cue.

The aggregation of information can take various forms regarding the amount of aggregated information and the formulation of the aggregated cue. In its most simple form, it may relate to an encoding of a numeric value into a categorical value, such as expensive/economical or long/short. In its more complex form, encoding of cues may take whole patterns. Stingl et al. (2018) have provided examples of how executives of a project-based organisation consider various circumstantial cues of a project-bidding opportunity to formulate binary cues, such as 'Is the tender preparation feasible in meeting the deadline time?' or 'Can we beat the competition?'. The practitioners would then apply these self-generated cues in one-reason heuristics for the de-selection of project opportunities.

Consequently, research on heuristics in project practice can investigate which aggregated cues inform decisions and how the potential underlying heuristics (introduced as 'nested heuristics' by Shan and Yang, 2017) support the formulation of these aggregated or encoded cues.

Thus, we may ask, How do individuals aggregate and encode information into cues or meta-cues that represent patterns of information? Studying the role of heuristics in information aggregation or encoding would be relevant to both the development of individual decision experiences in complex settings and fostering of organisational contexts that increase the agility of decision making by aggregating information in line with individual cognitive strategies.

Again, the dynamic view expands the question by a longitudinal or comparative dimension, inquiring into the shaping role of the organisational environment. Three organisational characteristics in particular are likely candidates for exploration. First, organisational signals point to the salience and significance of

particular cues. Feedback, reporting structures or other routines may establish interpretive patterns that serve as cues in the subsequent decision. In our example, the project manager may have developed an understanding – for instance, through negative experiences or discussions with colleagues – that different functionalities of the commissioned system are differently sensitive to changes. Thus, the project manager may first consider the cue, 'Does it affect a critical functionality?' in approaching the change request. In a different project, the project manager may rely on other cues, such as information related to timing, the people involved, the location and so on.

Second, the organisational context may foster the development of higher fluency in interpreting particular types of information or data as easily usable cues. Fluency in interpreting pieces of information as cues is relevant because it reduces the cognitive load, which in turn favours the selection of a particular cognitive strategy (Pachur and Bröder, 2013). Fluency may result from the accessibility of the information presentation, such as easy-to-read red-amber-green charts or yes/no formats, as well as the project manager's relative familiarity with a fuzzy cue. For example, Gantt charts, the most prevalent visualisation tool for project scheduling, provide a simple depiction of the project's progress. Deviations and their implications for the overall project duration are easy to identify, even by novices, and potential mitigation strategies, such as speeding up other tasks, become more readily cognitively available.

Third, the availability of different types of information within the organisation is likely to affect the decisions following differences in the costs of information (Pachur and Bröder, 2013) – monetary costs but equally, time, effort or cognitive capacities. Thus, organisational structures and routines, related to reporting and other forms of data capturing, proximity to and friendly relationships with colleagues, language differences or simply trust in a source as the sole information provider can shape the selection of heuristics.

Thus, the dynamic view can ask the following questions: How does the organisational context shape the perceived salience of specific cues? How does the organisational context support the development of fluency in interpreting particular pieces of information as cues? How does the availability of information favour the development and selection of specific heuristics?

4.2.3. Developing and deliberating among alternatives

As ill-defined problems, most project decisions lack a clear-cut set of options or alternatives to respond to the decision problems. When taking a particular action, the alternatives are potentially unlimited, and the decision maker therefore needs to identify, frame and screen those alternatives with regard to the perceived decision problem.

In our example of the change request, this could mean that even with a clear problem framing, such as choosing a response action that creates the lowest financial exposure to the project, the potential action alternatives that the project manager may consider are not set. He/she might draw some alternatives from experience (e.g., requesting an amendment to the contract, increasing the price or politely refusing the change) but might also explore novel solutions particular to the request. Following Kaplan and Simon's (1990) argument, the problem-solving literature highlights the important role of heuristics in the development and screening of potential solutions. Specifically, heuristics can restrict the search space and can create the focus by providing rules for responses that can or cannot be followed in the particular situation. In our example, the project manager may know that it is against the strategic interest of the project to refuse reasonable change requests or that the area affected by the change is of low technical criticality. He/she may use those cues and heuristics as boundaries for the exploration of potential alternatives. Thereafter, heuristics can support the screening and the selection of these identified alternatives (Albar and Jetter, 2013).

The resulting questions for this line of research therefore include the following: Which heuristics guide the search for response options? How do heuristics act as boundaries in the search for solutions? What heuristics do practitioners use to screen and select responses?

When adopting the dynamic view, the question expands to how experience and feedback in the organisational environment, combined with information availability, shape the heuristics that guide the identification of action alternatives, as well as the heuristics that allow selecting among the identified alternatives. In particular, knowledge sharing or feedback practices, reporting structures or interpretive frames of organisational narratives may lead to the development of particular heuristics among the project team members.

For example, if a project's steering committee repeatedly focuses on the issue of cost overruns while paying less attention to technical issues or client relation issues, this may steer the project manager's search towards solutions with low immediate effects on costs (but which may be detrimental to performance or customer relations). Moreover, the availability of similar previous experiences can serve as heuristics for the identification and the selection of solutions (Reiter-Palmon, 2017; Simon, 1990). Thus, this is the main question of the dynamic view: How does the organisational environment shape the heuristics used to identify, screen and select responses? In particular, this question may also distinguish between 'known' decision problems that share superficial similarities to problems that the decision maker has previously encountered and new problems that may only share (some) structural similarities.

Table 1 summarizes the developed framework of the research agenda and proposed illustrative research questions.

Table 1 - Framework of the research agenda with illustrative research questions.

	Static view: What are the cognitive strategies of the individual decision maker?	**Dynamic view: How does the context or the organisational environment shape these cognitive strategies over time?**
Framing: What is the perceived decision problem that the decision maker considers?	(How) Do heuristics inform the framing of the problem?	Which organisational characteristics shape the heuristics that project practitioners apply to frame a decision problem?
Information: How does the decision maker search for and elicit cues from an unstructured and ambiguous information environment?	How do practitioners search for and encode unstructured and ambiguous information into cues?	How does the organisational context shape the perceived salience of specific cues? How does the organisational context support the development of fluency in interpreting particular pieces of information as cues? How does the organisational context shape the 'cost of information' and consequently favour specific heuristics?
Options: How does the decision maker identify and select potential response alternatives?	Which heuristics do practitioners use to identify possible responses? Which heuristics do practitioners use to screen and select responses?	How does the organisational context shape the heuristics used to identify, screen and select responses?

4.3. Methodological suggestions

Following those three critical lines of inquiry within the static and the dynamic views, we see the need for a methodological expansion in simple heuristic research. The classic simple heuristic research provides established methods to identify the heuristics applied to well-defined decision problems with clear-cut cues. However, for the discussed research problems, we need to take into account the subjective perceptions of the decision maker, the fuzziness of the information and the potential shaping effect of the organisational environment. We believe that to explore those aspects adequately, we should incorporate more qualitative or mixed-method approaches into simple heuristic research. Considering that the researchers will have a limited *a priori* understanding of the practitioner's lived experience, a predefined set of likely framings is at high risk of being incomplete or misrepresenting the actuality of project decision making. To overcome this limitation, qualitative methods allow exploratory or open investigations that are helpful for the early inquiries into specific decision-making phenomena, when no specific decision problem or set of cues is apparent to the researchers. Thus, qualitative methods are necessary for the development of new theories or models regarding the role of heuristics in project decision making.

660

661 #### 4.3.1. Qualitative and mixed methods of researching project decision heuristics

662 Qualitative methodologies allow gathering insights on the framing of the decision problem, the acquisition
663 and use of information and cues, and the development of options. We expect those cognitive processes to
664 unfold in a manner that seems overlapping or intertwined to the external observer; thus, the methods
665 suggested in the following paragraphs are likely to produce insights on some or all of those aspects.
666 Research can follow two (not necessarily separated) streams of qualitative inquiry with different potentials
667 and limitations: observation and interview.

668

669 *Observational methods* capture any form of data on *what is done* and *what is said* during a decision
670 instance. Thus, they allow investigating the immediate behaviour of the decision maker(s), without any
671 influence of the researchers or post-rationalisation of the behaviour. However, during the observation, the
672 researchers have no opportunity to clarify or inquire about the decision maker's behaviour. Thus, such
673 methods require a sufficiently confined decision instance where aspects that are not at the centre of the
674 research but may influence the behaviour are fixed or can be observed. For example, if the observational
675 method aims at investigating information use, the researchers would need assurance that the decision
676 problem and the options are unambiguously clear to the observed individual(s). If these cannot be assured,
677 observational methods should include ways to capture the data on the problem framing or the option
678 identification, such as interviews or a research design where the participants formulate decisions or
679 judgments in a way that reveals their framing. A confined decision instance also means that researchers
680 have a nearly full grasp of the information that is available to the decision maker(s), an assumption
681 challenged by the expected use of cues from memory.

682

683 The best level of control for observational methods can be achieved through realistic decision simulations
684 in which the participants comment on the information search and the deliberation process in the form of a

685 think-aloud protocol. This method is suitable for decision instances with a well-defined information
686 environment, for example, when decision makers typically receive only a limited set of formalised
687 documents or presentations. This method may also be appropriate suitable for researching decision
688 problems at very early stages, where no prior information is available, or for high-level decision-making
689 bodies whose individual members assess the information about specific projects only in confined
690 committee meetings. Another possible empirical context may involve decisions related to abruptly
691 emerging situations.
692
693 A well-developed approach for this type of simulation research is the active information search (AIS)
694 method (Huber, 1997) that has previously been applied to the study of how project practitioners identify
695 risks in a new project (Stingl and Geraldi, 2019; Winch and Maytorena, 2009). AIS allows observing the
696 information search behaviour of an individual making a specific decision or performing a judgement in an
697 experimental setting with a controlled informational environment. This method combines observation data
698 on the information search behaviour with contextual data from a think-aloud protocol on how the
699 individual frames the information in the form of cues or bases one's judgements or decisions on those cues.
700 Thus, this method provides insights on the heuristics that guide the information search, on cues to which
701 the decision maker pays attention, on the heuristics that inform decisions or judgments and on contextual
702 factors that may explain the preferences for the observed heuristics. However, the observation of a
703 simulated decision context always bears the limitations of laboratory research, through the simplification of
704 a real-world problem, a tighter temporal frame, the potential absence of variations in the 'cost of
705 information acquisition' and so on. Thus, the findings may be indicative of real-world decisions yet may be
706 inappropriate representations of the latter.
707
708 An approach to studying real-world decision making without the limitations of simulations is shadowing
709 project practitioners or observing committee meetings, combined with reviewing documents and

conducting interviews to gauge the thinking process of decision makers. However, with this approach, the researchers may have limited control over all instances of information acquisition outside the researched environment, such as previously acquired information, informal chats and so on. Moreover, they might be unable to record the practitioners' reflections on newly acquired information, which can offer valuable insights into the choice and the salience of specific pieces of information.

Interviews can overcome some of the limitations of observational studies but introduce their own shortcomings. In their simplest form, interviews can be semi-structured, directly asking for aspects such as decision framing, relevant criteria or choice of options, although with the risk of biasing the findings through post-rationalisation and other pitfalls of explicit interview methods (Nisbett and Wilson, 1977). More nuanced techniques from other fields of decision research allow adding a more subtle inquiry, typically combined with a simulation step to validate the explicitly described approaches. Specific methods include the applied cognitive task analysis (Militello and Hutton, 1998) or the critical decision method (Hoffman et al., 1998), both rooted in naturalistic decision-making research (Klein, 2015). These two-step methods first enable experienced decision makers to break down their tacit decision processes into explicit individual elements of the task. Based on the results of the first step, the researchers then develop decision scenarios for the second part of the method, in which the experienced individuals engage with the scenario to validate the task decomposition elicited in the first step. The structure of the task decomposition typically depicts individual cue-like information elements of the environment and structures them similarly to one-reason and multiple-cue heuristics.

Hence, these interview-based methods allow exploring how experienced practitioners structure their decision problems, as well as which information or cues they rely on for the individual sub-tasks. These methods also provide insights on how practitioners frame the decision problem, particularly their concept of a 'good decision' in the given context. The limitation of these methods lies in their time-consuming set-

735 up that can reduce the highly experienced (and thus very busy) practitioners' willingness to participate.
736 Moreover, these methods are suitable only for the exploration of conscious decision processes, thus
737 potentially masking the underlying preconsciously processed cues that may similarly influence the
738 decision.
739
740 While both observation and interview methods have their limitations, they allow identifying potential
741 framings of the decision problem, as well as a set of potentially used cues and how they inform the decision
742 through heuristics.
743

744 #### 4.3.2. Methods of researching the shaping effect of the organisational environment

745 The dynamic view extends beyond the mere identification of simple heuristics to comparative
746 investigations of how particular organisational characteristics lead to the development of such heuristics
747 for an individual decision maker or a group of individuals acting in that environment. Research on this
748 interplay between the organisational context and individual heuristics needs to gather data on structures,
749 routines or processes within the project organisation, its information context and how individuals navigate
750 in it. Such data could stem from ethnography-type research (Fetterman, 2010) on how people in the
751 organisation perceive and talk about the specific decision or other types of qualitative and quantitative
752 data on when and how individuals in the organisation encounter the decision and its consequences. For
753 example, to study the heuristics used to select projects, important contextual factors may relate to the way
754 that people in the organisation discuss the success or the failure of particular decisions, that is, the
755 individual consequences related to 'good' or 'bad' decisions. To explore the shaping effect of such
756 characteristics, the research needs to follow comparative study designs, such as multiple-case, longitudinal
757 (where characteristics change or can take effect over time) or even experimental studies.
758

While this approach to researching the interplay between the organisational context and individual decision making promises interesting insights, its key limitation lies in the mono-directional orientation of the simple heuristic framework. This theoretical approach inquires into how the context shapes the heuristics but does not provide a theoretical proposition on how individuals and their decisions, in turn, shape the organisational context. The simple heuristic framework may thus contribute to certain aspects of the focal interests of the contemporary sensemaking theory but is insufficient to reconcile the overall mechanisms of reinforcing organisational and individual behaviours.

This limitation can also constitute an opportunity for the daring academic. Indeed, one of the core research concerns in organisational theory is the mutual interplay between agency and structures, that is, individuals and organisations. Studies on how individuals influence the organisational context, as well as the fuzzy interplay between the organisation and the individual, therefore have the potential to make a theoretical contribution to the simple heuristic theory.

Finally, the decision contexts of projects are dynamic. What constitutes a fruitful organisational context in one phase of a project may no longer be appropriate at a later stage, as the decision context changes, and stakeholders start behaving differently. Hence, akin to concepts of core competence and dynamic capabilities, prescriptive research could explore the organisational contexts that foster not only selecting fruitful heuristics but also learning how to develop and choose fast and frugal heuristics as the organisational and decision contexts change.

5. Conclusion and outlook

Our research agenda has aimed to advance the discussion on simple heuristics from the potential applicability of the theory to an illustration of how it can be applied. Particularly, we have argued that the simple heuristics lens provides a fresh angle to examine ‘expert judgement’. Practitioners in organisations

often make decisions under high uncertainty and pressure to maintain legitimacy, professionalism and speed. We have observed practitioners camouflaging their expert judgement and intuition with what sounds rational and legitimate, such as analytical decision support tools and methods. Simple heuristics can provide an alternative view that values intuition and reflection in practice, as well as nurtures rich experiences.

Simple heuristics allow investigating individual decision making and its interaction with an organisational context as a set of learned and (preconsciously) selected cognitive strategies. This understanding of heuristics as being shaped by the environment and co-evolving among individuals operating in the same organisational and informational context sheds new light on sensemaking and provides a new theoretical framing to study group decision making.

In this paper, we have set out to systematically review the potential of the simple heuristic paradigm for the study of project decision behaviour, heading out from the practical problems of project decision making rather than from the theory of simple heuristics. Hence, we have sketched the main empirical problems and challenges of project decision making along the questions of which heuristics the decision maker uses (static view) and how the organisational environment shapes such heuristics (dynamic view). For each of these themes, we have then explored how a research approach of the simple heuristic paradigm can provide novel insights. In particular, we have provided illustrative research questions, suggested methodological approaches and pointed to the limitations and the challenges of each approach.

In conclusion, we have presented several arguments that the simple heuristic paradigm can contribute to all key areas of current research on project decision making behaviour and have indicated how it may do so. We thus contribute to two academic fields: project decision studies and simple heuristic research. We expanded project decision studies by providing guidance for empirical research within the simple heuristic

paradigm. We have done so by starting with the empirical context of interest and connecting the identified key research themes with avenues through which simple heuristics can provide new insights. We have thus reversed the argument previously brought forward for simple heuristics, which has merely identified managerial decision making as a suitable context that shares the characteristics of contexts in which simple heuristics are (arguably) likely to succeed. Our approach in developing a research agenda for project decision making may thus serve as a blueprint for further applications of simple heuristics to other empirical contexts of the managerial domain and beyond.

By rooting our approach in empirical phenomena rather than in the simple heuristic paradigm, we have also contributed to the 'heuristics in the wild' research as we have been able to point towards both limitations and opportunities of the simple heuristic paradigm in a new empirical context. In particular, we have revealed the potential for simple heuristics to broaden the research on the cognition of project practitioners when approaching ill-structured problems. Specifically, we have discussed the potential of single, nested or sequential heuristics in framing the problem, searching for and encoding unstructured information and identifying options. Finally, we have suggested alternative research methods that are suited for the complex and dynamic empirical context of managerial decision making.

Although aimed at academics, a practical implication of this paper is to expose practitioners to an alternative approach to identifying, describing, discussing and validating expert intuition. While managers silently accept 'gut feeling' and 'intuition' as part of their decision making, organisations are more likely to accept arguments based on procedural rationality. The consequence is that 'gut feeling' remains hidden or treated as a magic sixth sense that cannot be touched, discussed or validated. Practitioners may use the research methodologies offered in this paper to reflect and experiment on their own practice. The methodologies will help them identify, develop and test simple heuristics in organisations, specifically in areas such as forecasting, risk identification or the navigation of dynamic social changes.

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